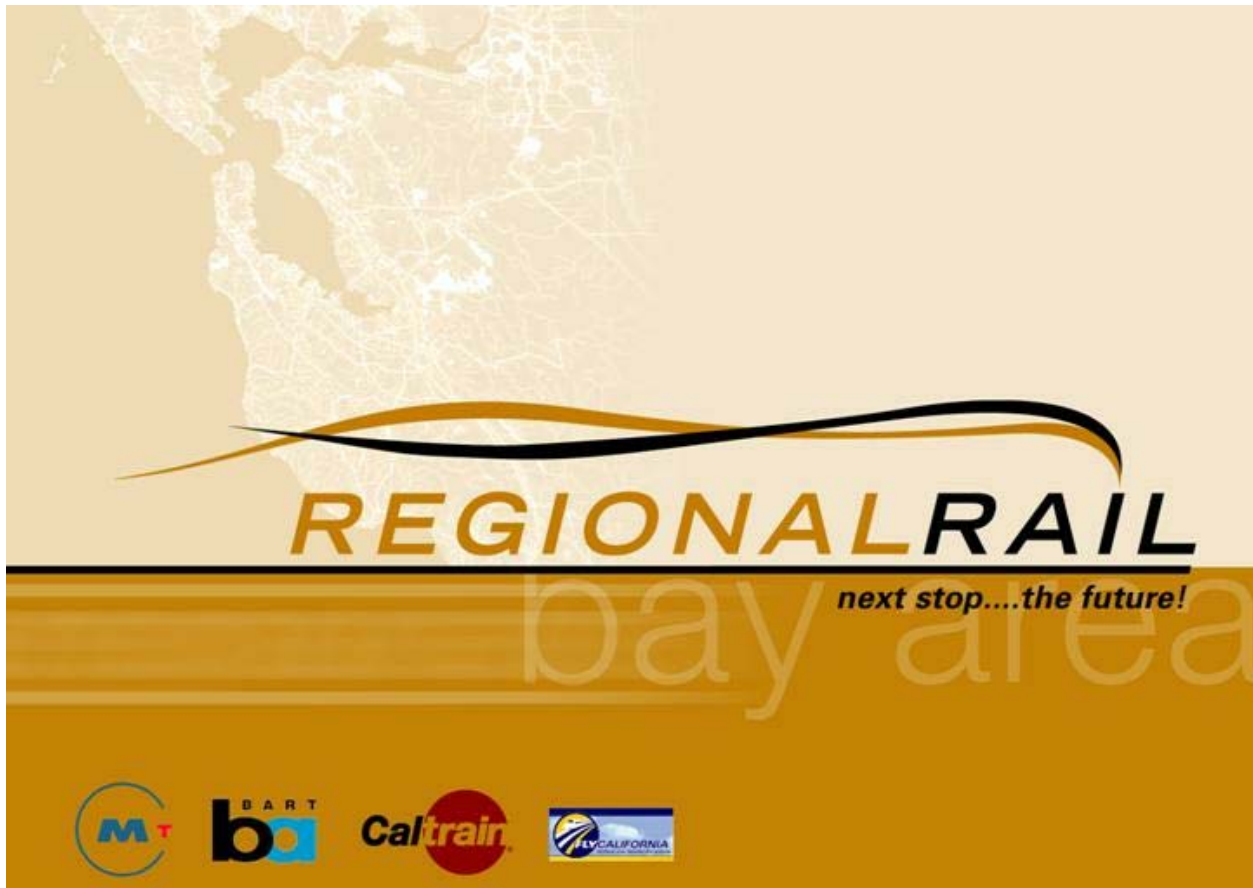


BAY AREA REGIONAL RAIL PLAN CONCEPTUAL ALTERNATIVES TASK

Technical Memorandum 3.b Systemwide Study Alternatives Refinements



February 9, 2007

OVERVIEW

This technical memorandum summarizes the refinements to Regional Rail Alternatives including BART and railroad-based regional rail services. (High speed rail options and overlay services will be addressed in a separate memorandum.) As such, this memo addresses System Alternatives 1 – 3 (System Alternatives 4 – 12 are those which include High Speed Rail and Regional Overlay Services.)

Since the initial conceptual alternatives were identified, the Regional Rail working group consisting of the Consultant Team acting under the direction of the Project Management Team has been developing information and assembling input from a wide range of sources including:

- Meetings and consultations with the two Class I freight railroads – the Burlington Northern Santa Fe (BNSF) and Union Pacific Railroad (UPRR);
- Meetings and consultations with Port of Oakland;
- Meetings and consultations with the Bay Area Rapid Transit District (BARTD) senior staff;
- Meetings and consultations with the Capitol Corridor Joint Powers Authority (CCJPA) senior staff;
- Meetings and consultations planners representing Caltrain, the Transbay Transit Center and Dumbarton Rail Project; and,
- Meetings and consultations with planners and officials representing various planning zones within the Regional Rail study area including the Tri Valley Area, City of San Francisco, City of San Jose, and other locations.

SYNOPSIS OF SUGGESTED REFINEMENTS

Based upon review and analysis of the data and input received, the working group has identified the following refinements:

- Elimination of many of the “freight by-pass” alignments from further consideration, resulting in the elimination of Systemwide Study Alternative 3;
- Consolidation and simplification of the three BART alternatives into two distinct study alternatives and design options which carry the most promising planning concepts forward for analysis, and,
- Refining Systemwide Study Alternatives 1 & 2 to include the most promising stations, alignments and services options including identified BART refinements, surviving freight-bypass options, and the most promising regional rail passenger services.

The following sections provide more detail on the proposed refinements as well as a summary description of the two refined alternatives.

BART REFINEMENTS

- Baseline Improvements – The BART system will require on-going investments to facilities and rolling stock to continue to provide a high quality of service to customers. These costs will be incurred regardless of any system expansion or growth in patronage. As such, these costs will be estimated separately from those associated with a particular alternative.
- Core Capacity – The BART system will need “Core Capacity” improvements to address issues such as station access and service reliability. Some of these needs are “backlog” needs which are outstanding at this point in time and other needs are future needs which may be necessary to accommodate anticipated increases in patronage regardless of specific system expansion plans. As such, these costs will be estimated separately from those associated with a particular alternative. (Additionally, system expansion options will include an estimate of additional “Core Capacity” needs which would be associated with a particular alternative.)
- Second Transbay Tube – Previous studies of the BART demand patterns and capacity constraints with the existing Transbay Tube and Market Street subway indicate that a second Transbay crossing and new San Francisco subway line will be required in the long term (post 2025). A second tube and new line would provide additional stations and coverage to regional destinations in San Francisco, and as such would provide for a better distribution of demands coming from four East Bay branches. By distributing the load to a second Peninsula branch, Core Capacity demands on the existing Market Street subway would be relieved, potentially avoiding the need to reconstruct existing stations in San Francisco. Construction of a fourth track and flexible connections in Oakland, along with additional non-revenue track connections to the existing Market Street subway in San Francisco, would provide operational flexibility to deal with a wide range of events which would otherwise impair operations. Two San Francisco alignments will be evaluated in Alternative 1: (1a) a new line between the Transbay Transit Center and Presidio Transit Center via Folsom, Van Ness and Lombard and (1b) between the 4th / Townsend Caltrain station and 33rd / Geary via Townsend, Division/13th, Van Ness and Geary. In addition to track connections in San Francisco, the new SF subway lines would have a concourse-level connection between a Van Ness / Civic Center stop and the existing Market Street / Civic Center stop. In the East Bay, the new line would provide two stops in Alameda and an optional Jack London Square stop connecting with the existing Amtrak depot and proposed new waterfront developments.
- Infill Stations – As only a limited number of infill station opportunities have been identified¹; it is proposed to include all candidate infill stations in each of the two alternatives to test the productivity of these stations with each of the major alternative transit networks.
- Express Trains - BART stations are closely-spaced in areas where land use densities are generally higher, making it undesirable to skip any of these stops; and, where stations are spaced far apart long extents of express trackage would be necessary to generate significant time savings for express trains. Thus it does not appear that development of express trackage would result in benefits which would justify the high cost of making retrofits to the system along with potential disruption during construction. Therefore no express trackage has been proposed. (However, additional trackage has been identified for Oakland and San Francisco for reasons noted in subsequent points.)

¹ Albany, San Antonio (East Oakland), West Dublin, Irvington (Fremont), Calaveras (Milpitas), and 30th Street (San Francisco).

- Skip Stop Service Plans – The time savings with “skip-stop” service would be only one or two minutes saved per pair of stations and passenger inconvenience would be experienced for persons boarding at an “A” stop who wished to disembark at a “B” stop. Skip-stop service is a potential strategy for management of under-performing stations and as such could be a strategy pursued by BART in specific circumstances but does not appear to have such applicability as to be “packaged” in a particular system alternative.
- Fourth Track in Oakland / “X” Operations Plan – Provision of a fourth track through Oakland is necessary as a point of connection for a second Bay Crossing but could be constructed without a new crossing to provide improved connectivity as it would enable cross-platform transfers between all East Bay lines. Therefore, the cost of constructing a fourth track from MacArthur to the Oakland wye has been developed independent of Bay Crossing costs. With convenient cross-platform transfers in Oakland, BART could streamline operations by eliminating some or all of the direct service to San Francisco from the Richmond and Fremont lines. This strategy could be pursued by BART in the event future improvements to the train control system do not reduce headways enough to serve future demands. However, the “X” or other revised operating plans would not be presumed in any of the system alternatives as passenger convenience would be maximized by retaining the existing four lines operating to San Francisco.
- eBART Options – The eBART project would provide service between the existing Pittsburg / Bay Point station and Byron. Rail plan alternatives for Year 2050 assume eBART would be extended further to Patterson via Tracy: Alternative 1 would consider use of standard equipment which could be shared with the existing freight service on the West Side line whereas Alternative 2 assumes use of non-standard (light weight) passenger equipment (freight needs between Tracy and Patterson would be accommodated using time separation in a similar fashion to Caltrain which allows freight during a limited mid-day window and overnight.)

REFINEMENTS TO RAILROAD-BASED SERVICES

- Freight By-Pass Options Eliminated – The following potential freight by-passes identified in Study Alternative 3 are recommended to be eliminated as specified below:
 - *I-80 Bypass (via New Antioch Bridge, Sacramento Northern alignment and new alignment to Roseville)* – Eliminated due to environmental concerns, potential high cost, need to re-assemble right-of-way and lack of interest by UPRR which is concerned with the need to serve interchange and industry points along existing line.
 - *Stockton – Sacramento Bypass (via Central California Traction)* – Eliminated due to existing short-line operation from Lodi to Stockton, adjacencies to residential land uses north of Lodi, and lack of need due to presence of two existing parallel freight lines which have expansion potential.
 - *Tracy – Fresno Bypass (via UPRR West Side Line)* – Eliminated due to gap in right-of-way through downtown Los Banos²; re-instatement of freight rail service would result in impacts to adjacent neighborhoods; additionally the line is paralleled by two existing freight lines which have expansion potential.

² Right-of-way through downtown has been converted to bike path.

- *Livermore – Pleasanton Bypass (south or north of Livermore)* – Eliminated due to environmental near-fatal flaws and residential land use adjacencies on the southern alignment shown in the draft systemwide alternatives and due to land use adjacencies and lack of overall benefit to UPRR on a second northern alignment which was studied.
- Freight By-Pass Options Retained – The remaining freight-only bypass opportunities are recommended to be included in Alternative 1, which expands regional passenger services primarily using lines shared with freight:
 - *Richmond – Port Chicago (BNSF)* – Existing freight-only line would continue to operate without passenger service; this line could potentially be jointly operated in conjunction with UPRR Martinez subdivision, possibly for highly directional travel, to reduce the need to provide additional freight tracks along the Martinez subdivision between North Richmond and Port Chicago.
 - *Oakland – Newark (UPRR Coast Subdivision)* – Existing largely freight-only line³ would continue to operate without added passenger service.
- Refinement of Freight Operating Practices – Even with expansion of track capacity, with expansion of both freight and passenger traffic levels it may be necessary to modify freight dispatching practices to balance loads between various segments so this strategy should be included with Alternative 1. Conversely, with development of largely separated passenger-only lines, Alternative 2 would allow for continuation of existing dispatching practices by the freight railroads.
- Short-Haul Freight between Port of Oakland and Central Valley via Altamont (Alternatives 1 & 2) – Short haul freight would require additional track capacity, be subsidized and operated between Port of Oakland and various Central Valley freight intermodal ramps and ports including Port of Stockton (BNSF), Lathrop (UPRR) and new intermodal ramps developed along UPRR West Side line (Crows Landing near Patterson) or UPRR Fresno Subdivision. The short-haul freight would mitigate increases in truck traffic operating on the I-880, I-580/I-205 and I-5 / SR-99 corridors.
- Addition of Service from Merced to Oakland via Altamont (Alternatives 1 & 2) – Alternative 3 included a concept to provide a Merced to Oakland service operating via the UPRR Fresno subdivision passing through downtown districts between Merced and Manteca. This service concept has been added to Alternative 1 operating on shared trackage with UPRR freight services and to Alternative 2 operating on new separate passenger trackage along the UPRR freight lines or alternative parallel alignments such as the old SPRR alignment through the Altamont Pass and Niles Canyon. (Existing long-haul services such as the “San Joaquin” trains would continue to operate via the BNSF between Bakersfield and Oakland via Stockton and Martinez.)
- Extension of US 101 North (“SMART”) Service to Stockton (Alternative 2) – As a complement to a new lightweight separate passenger network, standard equipment operating in the US 101 North corridor could be extended to Stockton. The route would be via an alignment identified by SMART serving a potential future ferry terminal at San Quentin then across San Pablo Bay to the vicinity of Richmond BART / Capitol Corridor stop via a reconstructed I-580 bridge and abandoned BNSF right-of-way parallel to Ohio Avenue

³ The long-haul Coast Starlight train operates on this trackage.

in Richmond. From that point, the line would utilize UPRR trackage from Richmond to Port Chicago and BNSF trackage from Port Chicago to Stockton. A new track connection would be provided in Stockton allowing the service to terminate at the Cabral ("ACE") Depot on Channel Street along the UPRR. (Alternative 1 would provide an express bus connection across the Richmond – San Rafael bridge between San Rafael and the Richmond BART/Amtrak station where "San Joaquin" services could be accessed.)

- I-80 Corridor New Rail Alignment (Alternative 2) – Engineering investigation of possible improvements to provide separate passenger rail trackage across the Carquinez Strait has identified significant feasibility constraints at the existing Martinez – Benicia crossing. A separate passenger bridge, if constructed, should provide a high level crossing not subject to the significant operational delays encountered by Capitol Corridor trains operating on the existing low-level bridge. However, it is not feasible to provide a desirable profile grade for a high-level structure which would meet the trackage serving the existing Martinez passenger station. In addition, the existing rail and highway bridge and new highway bridge under construction makes construction of a fourth span at this location problematic. At the same time, a viable alignment has been identified which would traverse from a point north of the new Capitol Corridor Hercules station to I-80 and which would follow I-80 across the Carquinez, potentially utilizing the existing foundations for the highway bridge presently being dismantled. The alignment would continue to follow I-80 resulting in a new station at the SR-37 / I-80 interchange near the north Vallejo Fairgrounds redevelopment area and connecting back to the UPRR Martinez subdivision right-of-way in Cordelia. This alignment would also avoid direct involvement with high maintenance efforts required to construct and maintain high-speed track geometry through the environmentally-sensitive wetlands and peat bogs in Suisun Bay between Benicia and Cordelia. (The Martinez station would continue to be served by the long-haul Amtrak trains including the "San Joaquin" services, the "California Zephyr" and "Coast Starlight" trains along with the SMART service to Stockton described above.) While this alignment would not directly serve downtown Vallejo, the North Bay services operating north-south between Vallejo and St. Helena and east-west between San Rafael and Fairfield/Vacaville would connect with I-80 corridor trains in Suisun City and at Fairfield/Vacaville.
- East Bay Corridor (Alternative 2) – The Oakland Subdivision would be upgraded to provide a grade separated passenger-only route between Oakland and San Jose: Separate passenger trackage would be provided within the Niles Subdivision from the Oakland Amtrak depot, or potentially the West Oakland BART station, down to "Melrose" near High Street where the Oakland Subdivision branches. In Fremont, separate passenger trackage would be constructed along the Warm Springs subdivision right-of-way down to Milpitas. South of that point, the alignment would follow Mission Boulevard to I-880, I-880 to Trimble, Trimble to UPRR Coast Subdivision and UPRR Coast Subdivision into San Jose Diridon station. This routing would not serve the existing Great America stop on the Coast Subdivision, but a new station at I-880 / Great America would provide a connection to the Tasman LRT line and serve as a connectivity point for shuttles and fixed-route buses serving "Golden Triangle" commercial and residential sites.
- South Counties (Alternative 2) – Passenger trackage consisting of a single track with passing sidings could potentially satisfy schedule requirements south of San Jose down to Hollister. Connections would be made in Gilroy to standard services operating to Salinas; the Gilroy – Salinas train would meet Santa Cruz – Monterey trains at Pajaro for connections to the north and at Castroville for connections to the south.

BUS LINKS

Selected regional bus link connections would be added to existing bus services to complement the regional rail system plan as noted below:

- Calistoga Feeder Bus (Alternatives 1 & 2) – The right-of-way of the former Napa Valley Railroad has been abandoned and incorporated into vineyard properties north of St. Helena. Re-establishment of rail would require re-purchase of right-of-way and modifications to many roadways and vineyard properties. For the purpose of patronage testing, a bus-only connection to Calistoga will be modeled and the rail service potential will be re-evaluated pending results from the travel demand forecasting.
- US 101 & Route 1 Corridor Bus (Alternatives 1 & 2) – A regional express bus would be operated between the San Rafael SMART station and BART Daly City Station via US 101 and Route 1. The bus would provide connections to either a Presidio intermodal (BART Alternative 1.a), or a Park Presidio / Geary stop (BART Alternative 1.b). Connections would be made to all of the MUNI light rail lines crossing the route as well as to principal bus lines.
- Regional Bus between eBART and Livermore via Vasco Road (Alternatives 1 & 2) – The Tri Valley cities have identified a travel demand market between the Livermore area and Eastern Contra Costa County. Whereas provision of rail service in the Vasco Road corridor would require extensive grading and tunneling due to the curvature and grades of the existing highway alignment, Alternative 1 and 2 will include consideration for an express bus link between Livermore and Pittsburg. The express bus would connect with conventional BART and eBART at the Pittsburg / Bay Point station and would terminate at the BART East Dublin / Pleasanton BART station, operating via Stanley Blvd. to downtown Livermore, and Vasco Road to Antioch and Pittsburg. The bus service would connect with the end-of-line Tri Valley BART station (at a new Greenville / I-580 / UPRR BART and “ACE” station in Alternative 1 or at a new Isabel Road / UPRR BART and “ACE” station in Alternative 2.)
- I-680 Regional Bus Connection (Alternative 2) – Tri Valley cities and Contra Costa County has identified express bus as an alternative to rail for the I-680 corridor. For the purpose of providing connectivity with the balance of the separate higher speed regional rail system, a “680 Connector” express bus will be included operating between the Fairfield Transit Center near the I-80 / West Texas / Beck intersection and the VTA Tasman I-880 / Milpitas LRT station. The express bus would connect to the higher speed rail stop at Cordelia, and to the proposed BART Warm Springs station as well as other intermediate points.

FINAL DESCRIPTION OF SYSTEMWIDE STUDY ALTERNATIVE 1

(System plan and services maps attached.)

Key Characteristics

- No High Speed Rail
- Standard Passenger Rail Shared with Freight (Capacity Improvements as Needed)
- Freight Dispatching Optimized for Best Use of Capacity on Shared Lines
- Separate freight and Passenger tracks on high capacity corridors
- Short Haul Freight between Port of Oakland and Central Valley via Altamont
- BART Regional System Expansion
- New BART Transbay Tube and San Francisco Subway
 - (1.a) Transbay Transit Center to Presidio Intermodal via Folsom – Van Ness – Lombard;
 - (1.b) 4th / Townsend to Geary / 33rd via Townsend – Division/13th – Van Ness – Geary

Corridor by Corridor Descriptions*US 101 North Corridor (San Francisco - Cloverdale)*

- Improve 101 corridor service operating between Larkspur or San Quentin to Cloverdale to support long term growth using standard passenger equipment mixed with freight service north of Ignacio Wye (Novato)
- Provide high frequency regional express bus connection across Richmond-San Rafael Bridge to connect between US 101 North corridor service at San Rafael and Richmond BART / I-80 Corridor services and long-haul “San Joaquin” trains
- Provide high frequency regional express bus connection between San Rafael and Daly City BART; connects to future MUNI Presidio Intermodal LRT/BART station (option 1.a), Geary/Park Presidio MUNI/BART (option 1.b) and existing MUNI light rail services (N, L and M lines) along Route 1

I-80 Corridor (Oakland – Auburn)

- Upgrade UPRR line to 3 or 4 tracks with grade separations and operational improvements for enhanced regional service operations with standard passenger equipment; add grade separations to 4-track segments

- Extend BART Richmond line to intercept station on I-80 north of Hercules
North Bay Corridor (US 101 to I-80 across San Pablo Bay between Petaluma and Cordelia)
- Operate St. Helena to Vallejo (feeder bus to Calistoga) and San Rafael to Fairfield / Vacaville service via NWP and California Northern lines

Peninsula Corridor (San Francisco – San Jose)

- Improve capacity to 2-4 tracks grade separated to support express and local services with electrified standard equipment; freight operates at night

South Counties Corridor (San Jose – Santa Cruz / Monterey / Salinas)

- Extend commuter service operating with standard equipment to Salinas with provision for San Francisco to Monterey long haul tourist train
- Operate Santa Cruz / Monterey service with connections at Pajaro & Castroville to San Francisco – Salinas trains

East Bay Corridor (Oakland – San Jose)

- Shared regional service with programmed capacity & operational improvements and additional capacity & operational improvements to support higher service levels; add grade separations at selected locations
- BART extension to Warm Springs & Santa Clara

Transbay (Oakland – San Francisco) & Dumbarton Corridors

- Construct 4th BART track through Oakland; break out of wye to new alignment serving Jack London Square & Alameda; provide new BART transbay crossing connecting to new San Francisco subway line between:

Option 1a: Transbay Transit Center and Presidio via Folsom, Van Ness and Lombard

Option 1.b: 4th / Townsend via Townsend, Division/13th, Van Ness and Geary

- Provide new rail station along UPRR trackage at Mandela Parkway and peplemover connection to West Oakland BART
- Dumbarton bridge service operates with standard consist between Peninsula and Union City with increased frequencies and reverse-peak service

Central Valley (Sacramento – Fresno)

- Improvements as necessary along BNSF and UPRR lines to accommodate growth in regional services and freight movements; extend existing Altamont Pass service north to Sacramento to provide Sacramento to San Jose trains; provide new Merced to Oakland service via UPRR over Altamont Pass providing more direct regional service to Oakland from San Joaquin Valley (BNSF line between Port Chicago and Fresno will continue to carry long-haul “San Joaquin” trains)
- Extend eBART to Tracy and Patterson using standard passenger equipment

Tri-Valley Corridor (I-580, I-680 & I-205 from East Bay to Tracy/Manteca)

- Upgrade UPRR route with capacity and operational improvements to provide higher speed service for regional trains to Central Valley; put SPRR alignment through Niles Canyon back in service to provide continuous second main between Niles Junction and Sunol; add trackage in Pleasanton and Livermore to provide two continuous main tracks; put SPRR alignment over Altamont Pass back in service and shift Altamont trains to former SPRR line; relocate Tracy station to downtown on former SPRR trackage and relocate Vasco Road station to provide intermodal with BART at Greenville Road / I-580 (refer to Central Valley for description of services)
- Extend BART system along I-580 to intermodal with regional rail standard trains at Greenville Road interchange with added BART stop at Isabel / I-580

I-680 Corridor (Fairfield – San Jose)

- Provide new BART line between Martinez Amtrak and Warm Springs BART generally following I-680 on aerial structure, former SP San Ramon Branch Line in subway, and I-680 and UPRR Warm Springs subdivision at grade; includes transfer stations at Pleasant Hill to Bay Point BART line and at East Dublin / Pleasanton to Dublin / Pleasanton BART line
- Provide express bus connection between East Dublin / Pleasanton BART and Pittsburg / Bay Point BART via Stanley Boulevard, downtown Livermore, Greenville Road BART, Vasco Road and SR-4

FINAL DESCRIPTION OF SYSTEMWIDE STUDY ALTERNATIVE 2

(System plan and services maps attached.)

Key Characteristics

- No High Speed Rail
- Lightweight Passenger Rail System Separated from Freight on the high volume corridors
- Freight Operating Practices Independent from Passenger Operations
- BART System Expansion Limited to Short Extensions to Improve Connectivity

Corridor-by-Corridor Description*US 101 North Corridor (San Francisco - Cloverdale)*

- Improve 101 corridor service operating between Larkspur or San Quentin to Cloverdale to support long term growth using standard passenger equipment mixed with freight service north of Ignacio Wye (Novato)
- Extend 101 corridor service to new ferry terminal at San Quentin and provide rail connection across reconstructed Richmond – San Rafael Bridge and along abandoned BNSF right-of-way connecting to UPRR Martinez Subdivision in Richmond so that compliant self-propelled multiple-unit trains operating to San Rafael as part of the proposed “SMART” service could operate through to Stockton via the UPRR and BNSF (refer to Central Valley service description)
- Provide high frequency regional express bus connection between San Rafael and Daly City BART meeting all trains at San Rafael; connects to future MUNI Presidio LRT station, and existing MUNI light rail services (N, L and M lines) along Route 1

I-80 Corridor (Oakland – Auburn)

- Construct new passenger line for lightweight equipment from Oakland to Auburn via UPRR right-of-way; follows I-80 between Hercules and Cordelia; including new bridge across Carquinez Strait at Vallejo (services operate from Auburn to Hollister via Oakland and San Francisco)

North Bay Corridor (US 101 to I-80 across San Pablo Bay between Petaluma and Cordelia)

- Operate St. Helena to Vallejo (feeder bus to Calistoga) and San Rafael to Fairfield / Vacaville service via NWP and California Northern lines

Peninsula Corridor (San Francisco – San Jose)

- Improve to 2-4 track grade separated electric system supporting express and local service between Hollister and San Francisco using lightweight electrified equipment; accommodation for night freight service using standard equipment (local service on Peninsula from San Jose continues via new Bay Crossing in I-80 Corridor to Vallejo)

South Counties Corridor (San Jose – Santa Cruz / Monterey / Salinas)

- Provide service between Gilroy and Salinas using standard equipment to meet all regional trains operating to Hollister
- Operate Santa Cruz – Monterey service using standard equipment connecting to Gilroy – Salinas trains at Pajaro & Castroville

East Bay Corridor (Oakland – San Jose)

- Construct separate passenger-only tracks from Oakland to San Jose via UPRR Oakland subdivision from Oakland to Niles, along UPRR Warm Springs subdivision from Niles to Mission Boulevard, via I-880 from Mission Boulevard to Montague Expressway, and via Montague Expressway and Trimble Road from I-880 to UPRR Coast subdivision right-of-way in San Jose.

Higher speed lightweight express services operate Oakland to San Jose along this line which also carries Dumbarton Bridge service from Oakland to San Jose and Altamont service from Sacramento to San Jose.

- BART extension to Warm Springs & Santa Clara

Transbay Corridors (Oakland – San Francisco & Dumbarton)

- New transbay rail tunnel from Transbay Transit Center and 4th/Townsend to Oakland; extend Peninsula express and local service w/ lightweight electric equipment to I-80 corridor with locals terminating at Vallejo and express continuing on to Auburn. Includes connection to BART system at West Oakland stop.
- Dumbarton service operates with lightweight electric on separate trackage through Centerville between Peninsula and East Bay; in conjunction with electrification, the proposed Union City service is extended to Oakland resulting in an Oakland to San Jose via Dumbarton route and the proposed Millbrae/SFO service is extended and re-routed resulting in a San Francisco to Merced via Altamont service.

Central Valley (Sacramento – Fresno)

- Develop separate trackage for operation of lightweight passenger equipment along UPRR for regional service from Merced to Sacramento make capacity improvements to BNSF and re-route freight traffic to optimize system capacity; develop separate trackage for operation

of lightweight passenger equipment for service between Sacramento and San Jose via Stockton, Tracy and Tri Valley as well as service between Merced and San Francisco via Manteca, Tracy and Tri Valley (refer to Tri Valley for details); existing service using standard equipment shared with freight operating between Stockton and Martinez would be provided by interlining with trains from San Rafael operating over a reconstructed Richmond – San Rafael Bridge and existing UPRR from Richmond to Port Chicago. San Joaquin service would only be operated between Sacramento and Bakersfield via BNSF.

- Extend eBART to Tracy and Patterson using lightweight passenger equipment

Tri-Valley Corridor (I-580, I-680 & I-205 from East Bay to Tracy/Manteca)

- Construct separate higher-speed regional passenger line from Stockton to Niles following former SPRR from Stockton to downtown Tracy with new crossing at Patterson Pass, separate trackage along UPRR alignment through Livermore and Pleasanton, and new tunnel from Sunol to Niles; services operate from Sacramento to San Jose and from Merced to San Francisco (refer to Central Valley corridor description)
- Extend BART one stop via El Charro Road to new intermodal terminal with regional lines and buses at Isabel / UPRR

I-680 Corridor (Fairfield – San Jose)

- Provide express bus service along I-680 corridor between VTA I-880 / Milpitas LRT station (Tasman Line) and Suisun regional station via I-880 to SR-237 to I-680 with connections to BART Calaveras station (SR-237), BART Irvington station, Pleasanton regional station, BART West Dublin station, BART Walnut Creek station, Martinez Amtrak station, Cordelia regional station, Fairfield Transit Center and Suisun regional station
- Provide express bus connection between East Dublin / Pleasanton BART and Pittsburg / Bay Point BART via Stanley Boulevard, Isabel Road BART, downtown Livermore, Vasco Road and SR-4

CONNECTIVITY POINTS

The table on the following pages lists principal connection points where transfers between various regional lines, BART, and regional connector buses would occur. Additional local bus transit and shuttle connections would occur at these and other stations.

<p style="text-align: center;"><u>Principal Connectivity Points</u> (Listed by Distance then North-East-South-West)</p>	
ALTERNATIVE 1	ALTERNATIVE 2
<p><i>East Bay, South Bay and Peninsula</i></p> <p><u>Martinez Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • BART – I-680 Corridor line • Oakland – Bakersfield long haul trains • Emeryville – Chicago long haul trains • Los Angeles – Seattle long haul trains <p><u>Richmond Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • BART – Richmond lines • Oakland – Bakersfield long haul trains • San Rafael – Richmond BART/Amtrak bus <p><u>West Oakland BART⁴</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Merced – Oakland via Altamont service • BART – Transbay tube Market St. lines • Oakland – Bakersfield long haul trains <p><u>Oakland Jack London Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Merced – Oakland via Altamont service • BART – New tube Alameda/SF lines • Oakland – Bakersfield long haul trains • Oakland – Chicago long haul trains • Los Angeles – Seattle long haul trains <p><u>Oakland Coliseum Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Merced – Oakland via Altamont service • BART – Fremont/Silicon Valley & Dublin/Pleasanton lines • Oakland Airport Connector peplemover 	<p><i>East Bay, South Bay and Peninsula</i></p> <p><u>Martinez Station</u></p> <ul style="list-style-type: none"> • San Rafael – Stockton service • Emeryville – Chicago long haul trains • Los Angeles – Seattle long haul trains <p><u>Richmond Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Rafael – Stockton service • BART – Richmond lines <p><u>West Oakland BART⁵</u></p> <ul style="list-style-type: none"> • Auburn – San Jose service via Peninsula • Oakland – San Jose service • Oakland – San Jose Dumbarton service • BART – Transbay tube Market St. lines <p><u>Oakland Jack London Station</u></p> <ul style="list-style-type: none"> • Los Angeles – Seattle long haul trains <p><u>Oakland Coliseum Station</u></p> <ul style="list-style-type: none"> • Oakland – San Jose service • Oakland – San Jose Dumbarton service • BART – Fremont/Silicon Valley & Dublin/Pleasanton lines • Oakland Airport Connector peplemover

⁴ New station on Auburn – San Jose line with peplemover connection to existing West Oakland BART

⁵ New station for regional trains (subway under 7th Street)

<p style="text-align: center;"><u>Principal Connectivity Points</u> (Listed by Distance then North-East-South-West)</p>	
ALTERNATIVE 1	ALTERNATIVE 2
<p><u>Union City Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Merced – Oakland via Altamont service • Union City – Millbrae/SFO Dumbarton service • Union City – San Jose Dumbarton service • BART – Fremont/Silicon Valley line <p><u>Fremont Centerville Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Sacramento – San Jose via Altamont service • Union City – Millbrae/SFO via Dumbarton service • Union City – San Jose via Dumbarton service <p><u>Great America Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Sacramento – San Jose via Altamont service • VTA Tasman LRT line <p><u>Santa Clara/SJC⁶</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Sacramento – San Jose via Altamont service • Union City – San Jose Dumbarton service • San Francisco – San Jose Peninsula service • San Francisco – Salinas Peninsula service • BART Silicon Valley line 	<p><u>Union City Station</u></p> <ul style="list-style-type: none"> • Oakland – San Jose service • Oakland – San Jose Dumbarton service • BART – Fremont/Silicon Valley line <p><u>Fremont Centerville Station</u></p> <ul style="list-style-type: none"> • Oakland – San Jose via Dumbarton service • Merced – San Francisco via Altamont & Dumbarton service <p><u>Santa Clara/SJC⁶</u></p> <ul style="list-style-type: none"> • Oakland – San Jose East Bay service • Oakland – San Jose via Dumbarton service • Auburn – San Jose via Peninsula service • San Francisco – San Jose Peninsula service • San Francisco – Hollister Peninsula service • Sacramento – Hollister via Altamont service • BART Silicon Valley Line

⁶ Peoplemover connection between rail station and airport

<p style="text-align: center;"><u>Principal Connectivity Points</u> (Listed by Distance then North-East-South-West)</p>	
ALTERNATIVE 1	ALTERNATIVE 2
<p><u>San Jose Diridon Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Sacramento – San Jose via Altamont service • Union City – San Jose via Dumbarton service • San Francisco – San Jose Peninsula service • San Francisco – Salinas Peninsula service • BART Silicon Valley line • VTA Vasona LRT line <p><u>Palo Alto</u></p> <ul style="list-style-type: none"> • San Francisco – San Jose Peninsula service • San Francisco – Salinas Peninsula service • Union City – San Jose via Dumbarton service <p><u>Redwood City</u></p> <ul style="list-style-type: none"> • San Francisco – San Jose Peninsula service • San Francisco – Salinas Peninsula service • Millbrae / SFO – Union City via Dumbarton service <p><u>Millbrae/SFO</u></p> <ul style="list-style-type: none"> • San Francisco – San Jose Peninsula service • San Francisco – Salinas Peninsula service • Millbrae/SFO – Union City via Dumbarton service • BART Peninsula lines • BART – SFO connector 	<p><u>San Jose Diridon Station</u></p> <ul style="list-style-type: none"> • Oakland – San Jose East Bay service • Oakland – San Jose via Dumbarton service • Auburn – San Jose via Peninsula service • San Francisco – San Jose Peninsula service • San Francisco – Hollister Peninsula service • Sacramento – Hollister via Altamont service • BART Silicon Valley line • VTA Vasona LRT line <p><u>Palo Alto</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Francisco – San Jose Peninsula service • San Francisco – Hollister Peninsula service • Oakland – San Jose via Dumbarton service <p><u>Redwood City</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Francisco – Hollister Peninsula service • Merced – San Francisco via Altamont & Dumbarton service <p><u>Millbrae/SFO</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Francisco – Hollister Peninsula service • Merced – San Francisco via Altamont & Dumbarton service • BART Peninsula lines • BART – SFO connector

<p style="text-align: center;"><u>Principal Connectivity Points</u> (Listed by Distance then North-East-South-West)</p>	
ALTERNATIVE 1	ALTERNATIVE 2
<p><u>San Francisco (4th/Townsend)</u></p> <ul style="list-style-type: none"> • San Francisco – Salinas Peninsula service • San Francisco – San Jose Peninsula service • BART Geary Blvd. line (Alt. 1b) • Muni LRT lines <p><u>San Francisco (Transbay Transit Center)</u></p> <ul style="list-style-type: none"> • San Francisco – Hollister service • San Francisco – San Jose Peninsula service • BART Presidio line (Alt. 1a) • Muni LRT lines & BART Market St. lines <p><u>San Francisco (Presidio Intermodal – Alt. 1a)</u></p> <ul style="list-style-type: none"> • BART Presidio line • Muni LRT line • Golden Gate buses • San Rafael – Daly City BART bus <p><u>San Francisco (Geary/Park Presidio – Alt. 1.b)</u></p> <ul style="list-style-type: none"> • BART Geary Blvd. line • San Rafael – Daly City BART bus 	<p><u>San Francisco (4th/Townsend)</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Francisco – Hollister service • Merced – San Francisco via Altamont & Dumbarton service • BART Geary Blvd. line (Alt. 1b) • Muni LRT lines <p><u>San Francisco (Transbay Transit Center)</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Francisco – Hollister service • Merced – San Francisco via Altamont & Dumbarton service • BART Presidio line (Alt. 1a) • Muni LRT lines & BART Market St. lines

<p style="text-align: center;"><u>Principal Connectivity Points</u> (Listed by Distance then North-East-South-West)</p>	
ALTERNATIVE 1	ALTERNATIVE 2
<p><i>Greater Bay Area and Northern California</i></p> <p><u>San Rafael</u></p> <ul style="list-style-type: none"> • San Rafael – Cloverdale service • San Rafael – Fairfield/Vacaville service • San Rafael – Richmond bus • San Rafael – Daly City BART bus <p><u>San Quentin Ferry</u></p> <ul style="list-style-type: none"> • San Rafael – Cloverdale service • San Rafael – Richmond bus <p><u>Napa Junction Station</u></p> <ul style="list-style-type: none"> • St. Helena – Vallejo ferry service • San Rafael – Fairfield/Vacaville service <p><u>Vallejo Station</u></p> <ul style="list-style-type: none"> • St. Helena – Vallejo ferry service • San Francisco ferry <p><u>Fairfield/Vacaville Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • San Rafael – Fairfield/Vacaville service <p><u>Sacramento Valley Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via East Bay service • Sacramento – Hollister via Altamont service • Sacramento – Merced service • Sacramento – Bakersfield long haul trains • Los Angeles – Seattle long haul trains • Emeryville – Chicago long haul trains • Sacramento Regional Transit LRT <p><u>Stockton Cabral Depot (UPRR)</u></p> <ul style="list-style-type: none"> • Sacramento – Hollister via Altamont service • Sacramento – Merced service • Sacramento – Bakersfield long haul trains • Bus link to Oakland – Bakersfield long haul trains stopping at BNSF San Joaquin St. depot 	<p><i>Greater Bay Area and Northern California</i></p> <p><u>San Rafael</u></p> <ul style="list-style-type: none"> • San Rafael – Cloverdale service • San Rafael – Fairfield/Vacaville service • San Rafael – Stockton service • San Rafael – Daly City BART bus <p><u>San Quentin Ferry</u></p> <ul style="list-style-type: none"> • San Rafael – Cloverdale service • San Rafael – Stockton service <p><u>Napa Junction Station</u></p> <ul style="list-style-type: none"> • St. Helena – Vallejo ferry service • San Rafael – Fairfield/Vacaville service <p><u>Vallejo Station</u></p> <ul style="list-style-type: none"> • St. Helena – Vallejo ferry service • San Francisco ferry <p><u>Fairfield/Vacaville Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • San Rafael – Fairfield/Vacaville service • Fairfield/Vacaville – Milpitas I-680 bus <p><u>Sacramento Valley Station</u></p> <ul style="list-style-type: none"> • Auburn – San Jose via Peninsula service • Sacramento – San Jose via Altamont service • Sacramento – Merced service • Sacramento – Bakersfield long haul trains • Los Angeles – Seattle long haul trains • Emeryville – Chicago long haul trains • Sacramento Regional Transit LRT <p><u>Stockton Cabral Depot (UPRR)</u></p> <ul style="list-style-type: none"> • Sacramento – San Jose via Altamont service • Sacramento – Merced service • San Rafael – Stockton service • Sacramento – Bakersfield long haul trains

<p style="text-align: center;"><u>Principal Connectivity Points</u> (Listed by Distance then North-East-South-West)</p>	
ALTERNATIVE 1	ALTERNATIVE 2
<p><u>Pleasant Hill BART</u></p> <ul style="list-style-type: none"> • BART Pittsburg/Bay Point line • BART I-680 line <p><u>Dublin/Pleasanton BART</u></p> <ul style="list-style-type: none"> • BART Dublin/Pleasanton line • BART I-680 line <p><u>Livermore (I-580/Greenville Rd.)</u></p> <ul style="list-style-type: none"> • Merced – Oakland via Altamont service • Sacramento – Hollister via Altamont service • BART Dublin/Pleasanton line • Vasco Road regional bus <p><u>Tracy</u></p> <ul style="list-style-type: none"> • Merced – Oakland via Altamont service • Sacramento – San Jose via Altamont service • eBART Pittsburg/Bay Point – Patterson service <p><u>Modesto (Downtown)</u></p> <ul style="list-style-type: none"> • Sacramento – Merced service • Merced – Oakland via Altamont service <p><u>Gilroy</u></p> <ul style="list-style-type: none"> • San Francisco – Salinas Peninsula service • Gilroy – Hollister shuttle <p><u>Pajaro</u></p> <ul style="list-style-type: none"> • Santa Cruz – Monterey service • San Francisco – Salinas Peninsula service <p><u>Castroville</u></p> <ul style="list-style-type: none"> • Santa Cruz – Monterey service • San Francisco – Salinas Peninsula service 	<p><u>Livermore (Isabel Ave./Stanley Blvd.)</u></p> <ul style="list-style-type: none"> • Merced – San Francisco via Altamont & Dumbarton service • Sacramento – San Jose via Altamont service • BART Dublin/Pleasanton line • Vasco Road regional bus <p><u>Tracy</u></p> <ul style="list-style-type: none"> • Merced – San Francisco via Altamont & Dumbarton service • Sacramento – Hollister via Altamont service • eBART Pittsburg/Bay Point – Patterson service <p><u>Modesto (Downtown)</u></p> <ul style="list-style-type: none"> • Sacramento – Merced service • Merced – San Francisco via Altamont & Dumbarton service <p><u>Gilroy</u></p> <ul style="list-style-type: none"> • San Francisco – Hollister Peninsula service • Sacramento – Hollister via Altamont service • Gilroy – Salinas service <p><u>Pajaro</u></p> <ul style="list-style-type: none"> • Santa Cruz – Monterey service • Gilroy – Salinas service <p><u>Castroville</u></p> <ul style="list-style-type: none"> • Santa Cruz – Monterey service • Gilroy – Salinas service

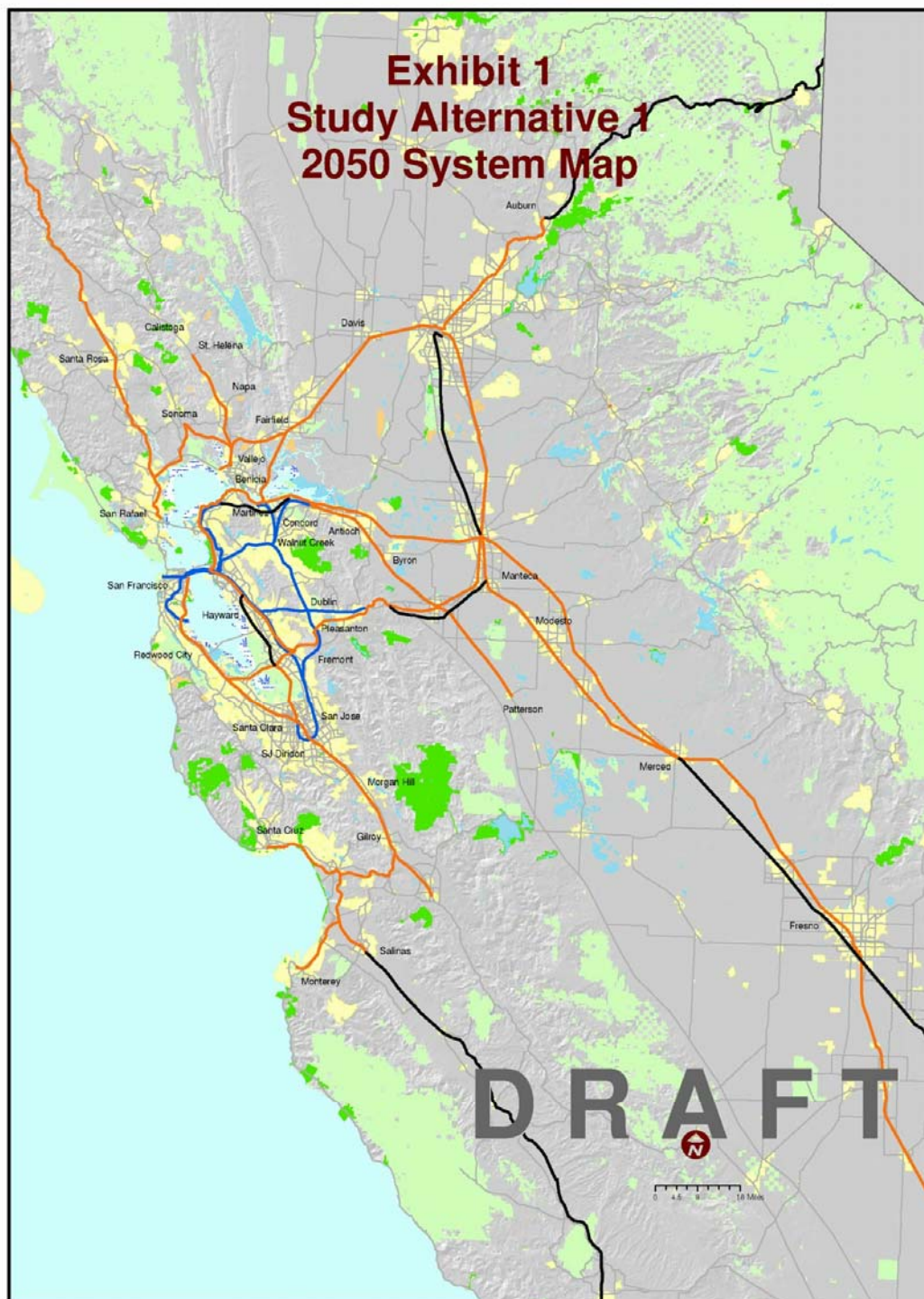
EXHIBITS

- Exhibit 1 – Study Alternative 1 / 2050 System Map
- Exhibit 2 – Study Alternative 1 / Regional Rail Principal Lines
- Exhibit 3 – Study Alternative 1 / BART System and Regional Rail Connections
- Exhibit 4 – Study Alternative 1 / Niles – Newark Detail Map
- Exhibit 5 – Study Alternative 2 / 2050 System Map
- Exhibit 6 – Study Alternative 2 / Regional Rail Principal Lines
- Exhibit 7 – Study Alternative 2 / BART System and Regional Rail Connections
- Exhibit 8 – Study Alternative 2 / Niles – Newark Detail Map

ATTACHMENTS

- Attachment A – Narrative Description of Existing and Proposed Services
- Attachment B – High Speed Rail Overlay Services
- Attachment C – BART Refinement Memo
- Attachment D – Tri-Valley Refinement Memo

Alternatives Refinement Memo - 3b - Rev 5 - Feb 07.doc
2/9/2007 3:39 PM

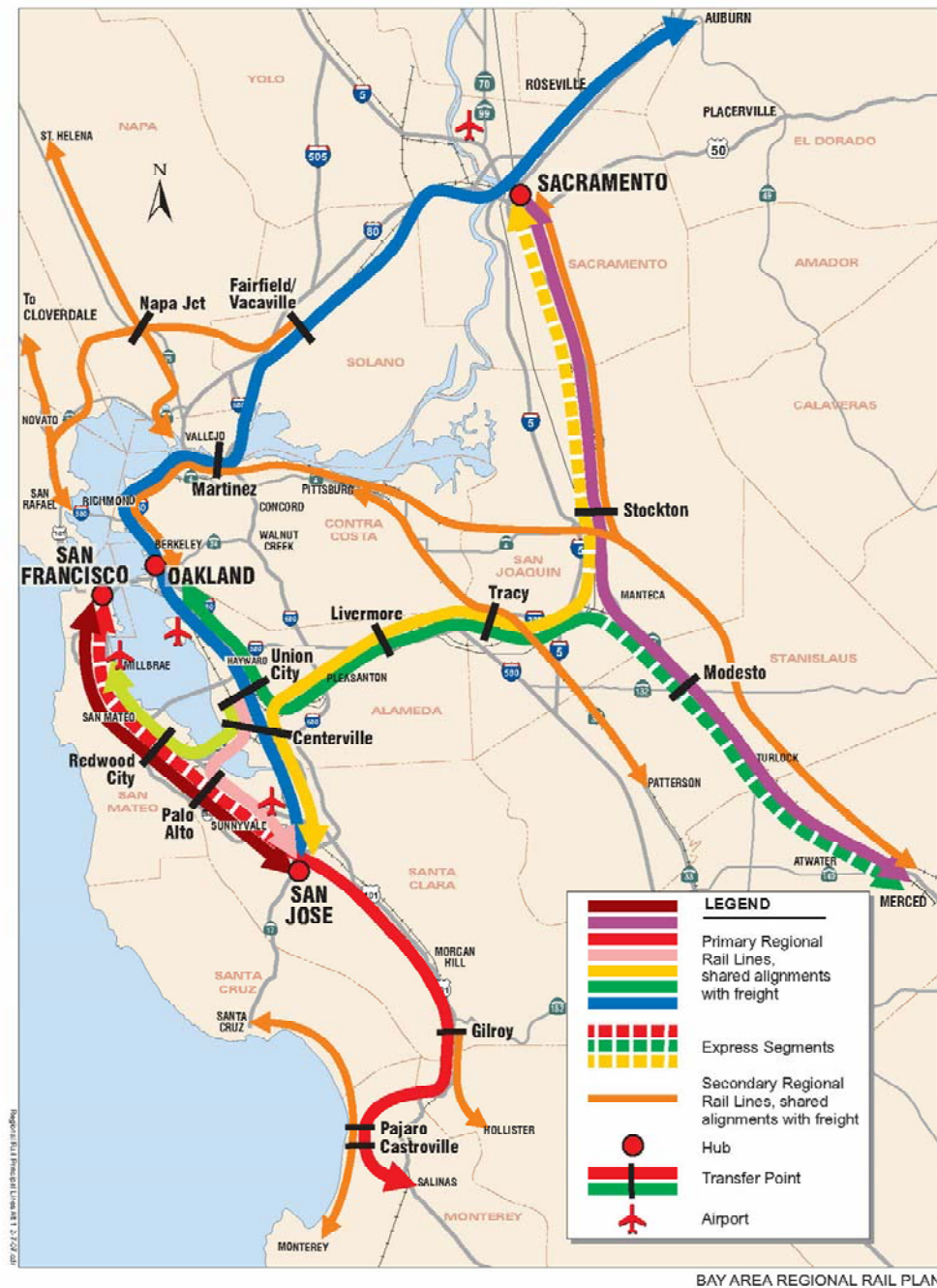
**Legend**

- | | |
|---|----------------------|
| ■ HSR only, light weight equipment, double track, fully grade separated | ■ Federal Lands |
| ■ Regional Passenger Rail, light weight, fully grade separated | ■ Park Areas |
| ■ HSR with Regional Passenger Rail | ■ Conservation Areas |
| ■ Freight/Regional Rail | |
| ■ Predominantly freight, standard equipment | |
| ■ BART | |

Exhibit 2

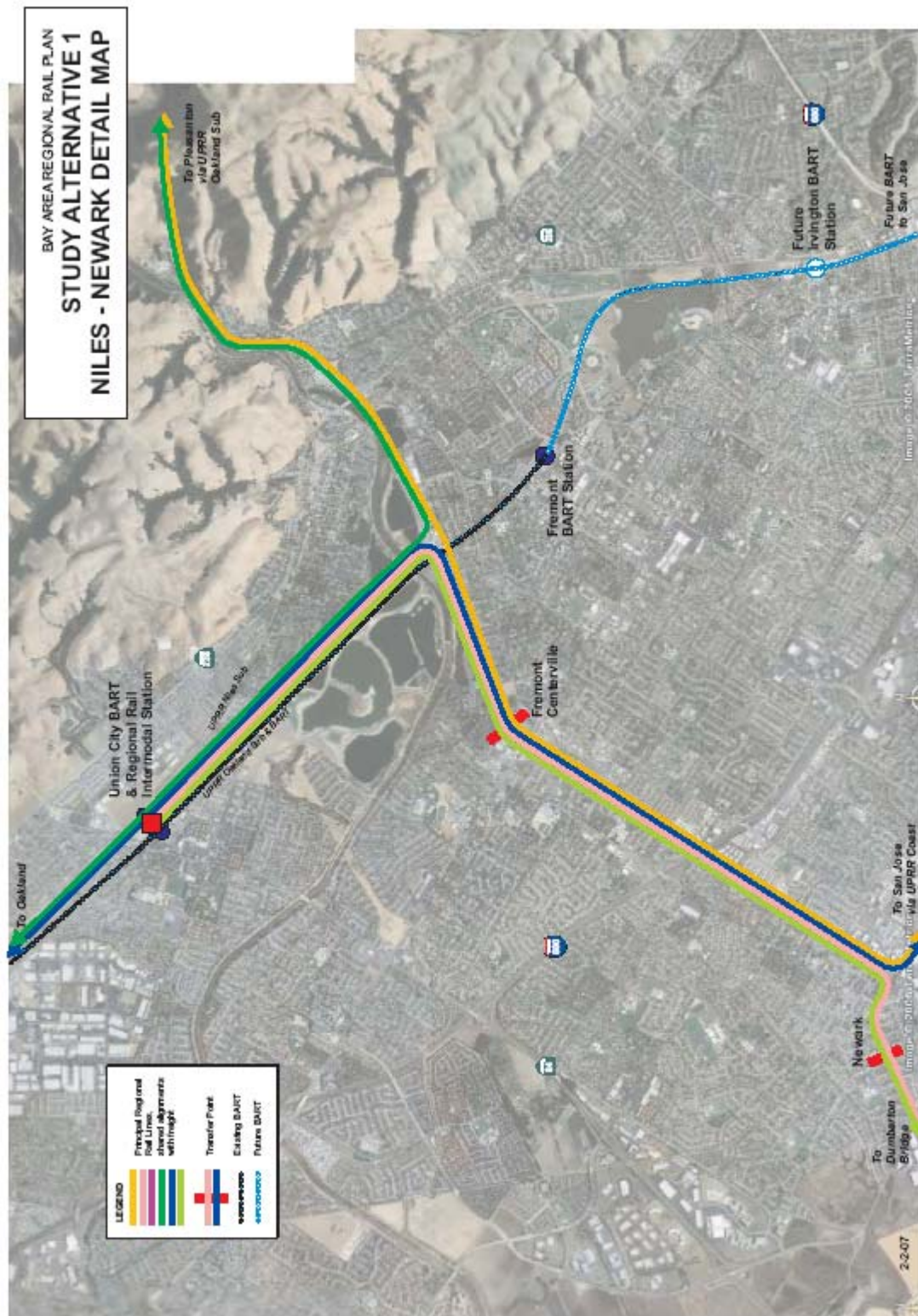


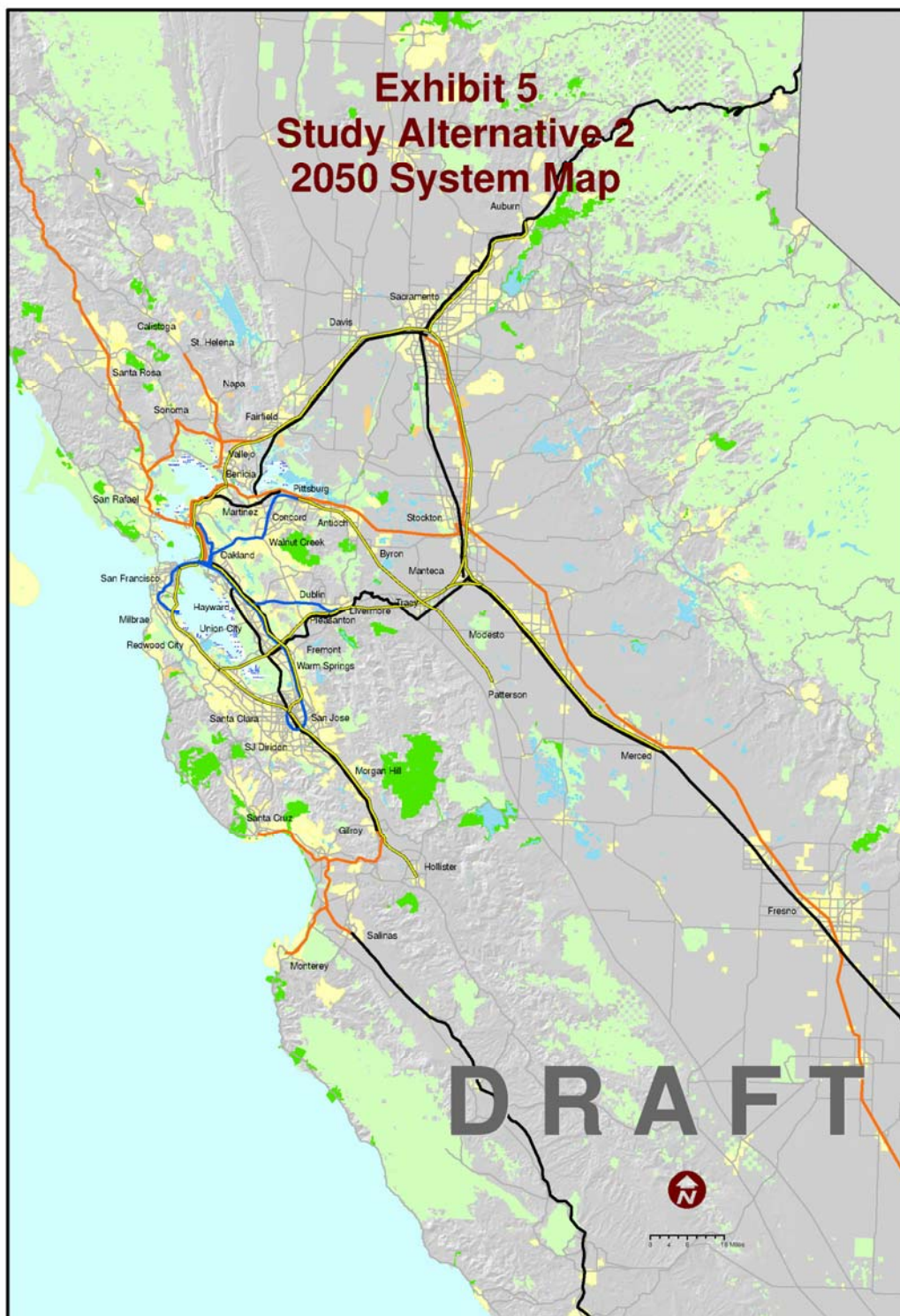
Exhibit 3



**STUDY ALTERNATIVE 1
REGIONAL RAIL PRINCIPAL LINES**

Exhibit 4



**Legend**

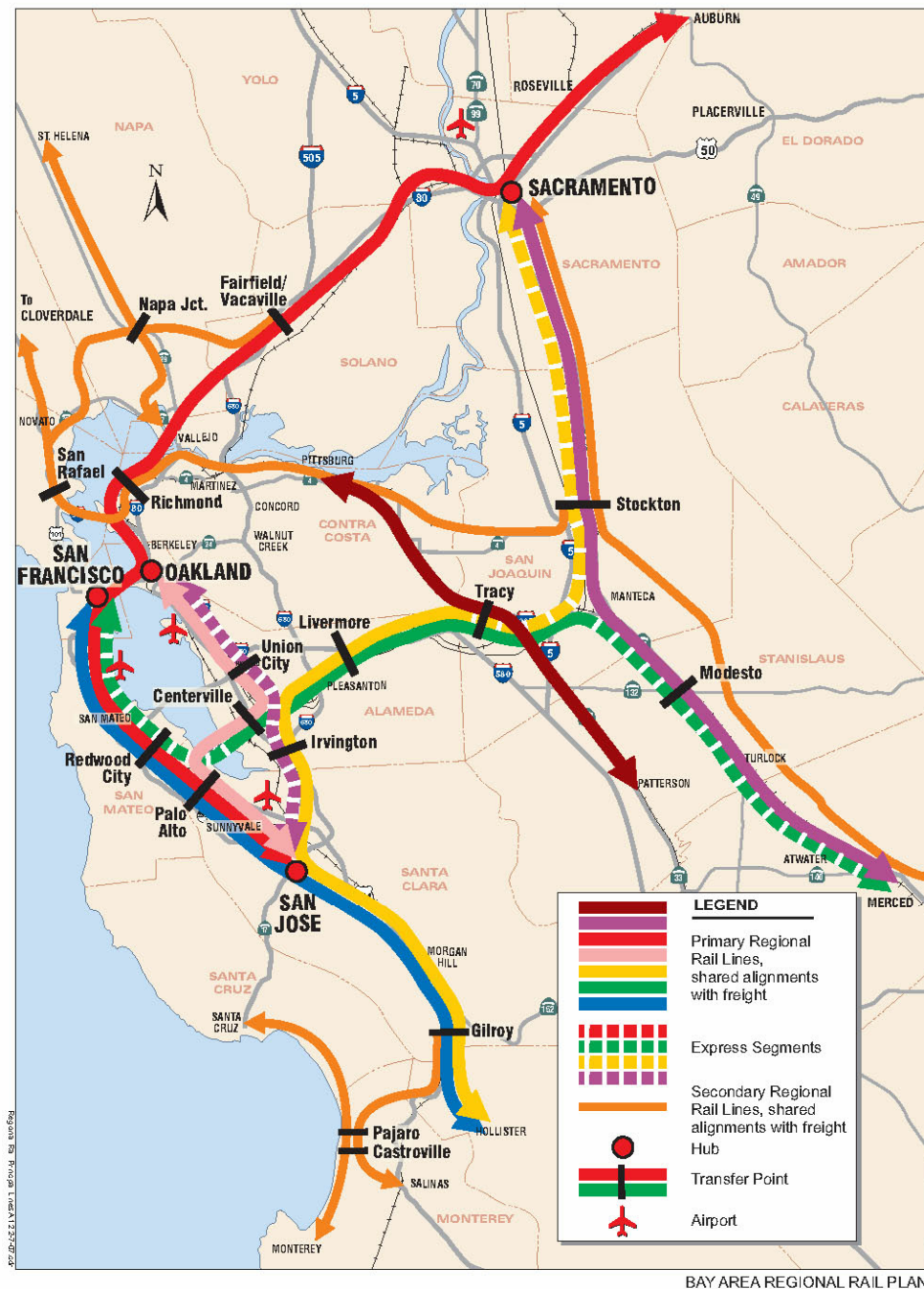
- HSR only, light weight equipment, double track, fully grade separated
- Regional Passenger Rail, light weight, fully grade separated
- HSR with Regional Passenger Rail
- Freight/Regional Rail
- Predominantly freight, standard equipment
- BART

- Federal Lands
- Park Areas
- Conservation Areas

Exhibit 6



Exhibit 7



**STUDY ALTERNATIVE 2
REGIONAL RAIL PRINCIPAL LINES**

Exhibit 8

